WHAT IS CLAIMED IS:

1. A method of removing aluminum fluoride deposits from a plasma etch reactor, comprising the steps of:

supplying a cleaning gas to a plasma etch reactor, the cleaning gas comprising at least BCl_3;

cleaning aluminum fluoride deposits from the plasma etch chamber by energizing the cleaning gas into a plasma state such that the BCl_3 gas is dissociated and undissociated BCl_3 reacts with aluminum fluoride deposits in the plasma etch reactor.

2. The method of Claim 1, wherein the cleaning gas includes Cl_2, the Cl_2 being supplied to the plasma etch reactor at a rate sufficient to obtain a desired degree of dissociation of the BCl_3.

3. The method of Claim 1, further comprising a step of plasma etching a layer of material on a semiconductor wafer, the plasma etching step including a main etch using at least $C_xH_yF_z$ as the main etching gas wherein $x \geq 1$, $y \geq 1$, and $z \geq 0$ and a $C_xH_yF_z$-free overetch using BCl_3 and optionally Cl_2 as the overetching gas.

4. The method of Claim 3, further comprising removing the semiconductor wafer from the plasma etch reactor prior to supplying the cleaning gas to the plasma etch reactor.

5. The method of Claim 3, wherein the layer of material comprises an aluminum layer and the main etching gas comprises $C_xF_yH_z$ wherein $x \geq 1$, $y \geq 1$, and $z \geq 0$, Cl_2, N_2 and BCl_3.

6. The method of Claim 3, wherein $C_xF_yH_z$ comprises CF_4, CHF_3 or mixture thereof.

7. The method of Claim 1, further comprising a step of conditioning the plasma etch chamber after the cleaning step.

8. The method of Claim 1, wherein the plasma etch reactor comprises an ECR plasma reactor, an inductively coupled plasma reactor, a capacitively coupled plasma reactor, a helicon plasma reactor or a magnetron plasma reactor.

9. The method of Claim 1, wherein pressure in the plasma etch reactor is 5 to 40 mTorr, 40 to 200 mTorr or 200 to 1000 mTorr.

10. The method of Claim 1, wherein the plasma etch reactor is an inductively coupled plasma reactor having an antenna which inductively couples radio frequency energy into an interior of the plasma etch reactor through a dielectric member, the plasma etch reactor including a bottom electrode on which the semiconductor substrate can be supported, the antenna being powered with 100 to 3000 watts during the cleaning step and the bottom electrode being powered with 0 to 3000 watts during the cleaning step.

11. A method of reducing aluminum fluoride deposits formed in a plasma etch reactor during processing of a semiconductor substrate, comprising steps of:

supporting a semiconductor substrate in a plasma etch reactor;

supplying an etching gas to the plasma etch reactor;

etching a layer on the semiconductor substrate during a main etch by energizing the etching gas into a plasma state, the etching gas used during the main etch including $C_xF_yH_z$ wherein $x \geq 1$, $y \geq 1$, $z \geq 0$, the main etch resulting in buildup of aluminum fluoride deposits on interior chamber surfaces exposed to the plasma within the plasma etch reactor;

etching the layer on the semiconductor substrate during an overetch etch by energizing the etching gas into a plasma state, the etching gas used during the overetch including BCl_3 which is at least partially dissociated in the plasma, the undissociated BCl_3 reducing the buildup of aluminum fluoride deposits on the interior chamber surfaces.

12. The method of Claim 11, wherein the etching gas used during the overetch is $C_xF_yH_z$-free and includes Cl_2 in an amount relative to the BCl_3 to provide a desired degree of dissociation of the BCl_3.

13. The method of Claim 11, wherein the layer comprises an aluminum layer covered with a patterned photoresist, the main etch forming a pattern of conductor lines in the aluminum layer.

14. The method of Claim 11, wherein the etching gas includes Cl_2 and/or BCl_3 during the main etch.

15. The method of Claim 11, further comprising removing the semiconductor substrate from the plasma etch reactor and cleaning the interior chamber surfaces by energizing a cleaning gas into a plasma state.

16. The method of Claim 15, wherein the cleaning gas includes O_2, Cl_2 and/or BCl_3.

17. The method of Claim 15, wherein the etching gas during the main etch includes at least CHF_3 and the cleaning gas includes BCl_3 and Cl_2, the Cl_2 being added in an amount relative to the BCl_3 to provide a desired degree of dissociation of the BCl_3.

18. The method of Claim 11, wherein the etching gas is supplied into the plasma etch reactor through a gas distribution plate (GDP) and the semiconductor substrate is a silicon wafer supported on a substrate support having a uniformity ring around an outer periphery of the wafer, the interior chamber surfaces including the gas distribution plate, the uniformity ring and a chamber wall surrounding the substrate support, the overetch step reducing buildup of aluminum fluoride deposits on the GDP, the uniformity ring and/or the chamber wall.

19. The method of Claim 11, wherein the semiconductor substrate comprises a silicon wafer having a layer of aluminum thereon, the etching gas during the main etch comprising CHF_3 supplied to the plasma etch reactor at a flow rate of less than 10 sccm.

20. The method od Claim 11, wherein the plasma etch reactor comprises an inductively coupled plasma reactor having an antenna which couples 100 to 3000 watts of RF power into an interior of the plasma etch reactor through a dielectric member, the plasma etch reactor including a bottom electrode on which the semiconductor substrate is supported, the bottom electrode being supplied 0 to 3000 watts RF power during the main etch and overetch steps.